

COGCC FORM 28
CENTRALIZED E&P WASTE MANAGEMENT FACILITY
SUPPLEMENTAL INFORMATION

P32 WATER IMPOUNDMENT FACILITY

BERRY PETROLEUM COMPANY
OPERATOR NUMBER 10091

February 2013

According to the 100 Series rules of the Colorado Oil and Gas Conservation Commission (COGCC), a **CENTRALIZED E&P WASTE MANAGEMENT FACILITY** shall mean a facility, other than a commercial disposal facility regulated by the Colorado Department of Public Health and Environment, that (1) is either used exclusively by one owner or operator or used by more than one operator under an operating agreement; and (2) is operated for a period greater than three (3) years; and (3) receives for collection, treatment, temporary storage, and/or disposal of produced water, drilling fluids, completion fluids, and any other exempt E&P wastes that are generated from two or more production units or areas or from a set of commonly owned or operated leases.

This supplement to the COGCC Form 28 for the Berry Petroleum Company's (Berry) proposed P32 Water Impoundment Facility provides additional information required by COGCC Rules 704 and 908. This information is defined in the following sections by reference to the applicable sections of Rules 704 and 908. In order to secure local land use permitting approval, Berry has also submitted a Limited Impact Review (LIR) application with Garfield County. As noted below and per rule 908, information related to the Garfield County LIR approval has been provided with this application. In addition, a COGCC Form 2A has been submitted for this impoundment. The location of this facility was originally identified as the Milk Cabin "32 595" pad. The Centralized E&P Waste Management Facility will be identified as the P32 Water Impoundment Facility. This facility will be located on Old Mountain, northeast of Parachute, Colorado.

Berry is proposing to construct and operate a permanent water storage impoundment to eliminate the need for water storage in multiple locations. This impoundment would enable reclamation of on-site storage pits on 3 locations within 3 miles of the proposed site. The produced water originates from Berry's I-02, B-10, C-10, K-15, L-15 and A-21 pads. This impoundment would also decrease the risk of a produced water release from a pit, decrease the risk to wildlife populations, and would decrease overall truck and water hauling traffic on roads.

The perimeter of the facility will be fenced and netted in order to restrict wildlife access according to criteria identified by the Colorado Parks and Wildlife Division (CPW) and the COGCC. The impoundment will be constructed with a double HDPE synthetic liner (60 mil and 40 mil) and a leak detection system. No permanent sanitation facilities will be required to accommodate operation of the facility. If necessary, human generated wastes will be accommodated by portable toilets placed near the boundary of the proposed facility. Potable water will not be required for the proposed facility. The facility will be accessible to Berry

personnel and will primarily be accessed during normal working hours from approximately 7:30 am to 6:00 pm Monday through Friday. During construction and operation of the facility, soil erosion will be controlled via the implementation of best management practices (BMPs) included in Berry's Stormwater Management Plan (SWMP).

An application for a permit for air emissions from the facility has been submitted to the CDPHE Air Pollution Control Division (APCD).

Rule 704. Financial Assurance

An estimate of the cost for proper reclamation, closure and abandonment of the proposed facility has been provided in Attachment O. Upon approval of the proposed facility and prior to commencing construction of the facility, Berry will provide the required financial assurance to the COGCC.

Rule 908.a. Applicability

The proposed impoundment is a non-commercial, centralized E&P waste management facility for the storage, recycling, and reuse of E&P waste and will serve Berry and EnCana Oil & Gas USA, Inc. (EnCana) operations in Garfield County, Colorado, as part of a Joint Operating Agreement (JOA). Berry and EnCana share a JOA on the North Parachute Ranch Property (Attachment B). As part of the local land use approval process in Garfield County, Berry has secured authorization from EnCana for the permitting, construction and operation of the facility.

Rule 908.b. Permit Requirements

Rule 908.b.(1) Contact Information

This facility will be operated by Berry. The information required by this rule is as follows:

Operator Name: Berry Petroleum Company
Address: 1999 Broadway, Suite 3700, Denver, CO 80202
Phone: (303) 999-4245
Contact Person: Bryan Burns

Rule 908.b.(2) Surface Owner

EnCana Oil & Gas USA, Inc. is the surface owner, and Berry Petroleum Company is the facility operator. Attached are the Operating Agreement between Berry and EnCana and a written authorization from EnCana to pursue the appropriate permitting for construction and operation of the facility.

The information required by this rule is as follows:

Surface Owner: EnCana Oil & Gas USA, Inc.
Local Address: 370 17th Street, Suite 1700, Denver, CO 80202
Phone: (303) 623-2300
Contact Person: Junene M. Tatham

Rule 908.b.(3) Legal Description

A parcel of land situated in the SESE, Section 32, Township 5 South, Range 95 West of the 6th Principal Meridian, Garfield County, Colorado.

EnCana Oil & Gas USA, Inc.

Garfield County Parcel Number: 2135-273-00-015

Rule 908.b.(4) Figures, Maps, Precipitation and Evaporation Rates

Topographic maps of the location, a report detailing the geology and hydrology of the site have been included under a separate tab. The average annual precipitation in the area of the facility is approximately 16 inches (Colorado Climate Center records for Altenbern Ranch station (station number 50214)). The average annual evaporation rate in the area of the facility is approximately 40 inches (National Weather Service Evaporation Map of the United States). Additional details are provided in Attachment C of this submittal.

Rule 908.b(5) Centralized Facility Siting Requirements

Rule 908.b.(5).A Site Plan

The site plan included in this submittal identifies all of the features of the facility, including fencing, access road improvements and drainage structures. Construction and drainage details are also provided in the grading plans and drainage plans. Drainage details have been prepared by a licensed professional engineer and are in accordance with COGCC requirements for surface flows. The entire plan set, signed and sealed by a licensed professional engineer, is provided as an attachment to this submittal. These plans are available in Attachment D.

Rule 908.b.(5).B Scaled Drawings

A survey plot is included with this submittal. The distance at the surface to the nearest section lines are approximately 831 feet from the south section line and approximately 438 feet from the east section line. A survey plat is available in Attachment D.

Rule 908.b.(5).C Access Control

Public access to the site will be controlled by a security station located on Wheeler Gulch Road near Garfield County Road 215 (Parachute Creek Road). Wheeler Gulch Road is a private road built and maintained by the natural gas industry to provide access to the top of the plateau, north of the Roan Cliffs and to the Old Mountain Field III. This road is for the exclusive use of the natural gas industry and associated vehicle traffic. All vehicles entering this road must stop at the security gate. All unauthorized public and private traffic is prohibited. An access road map is available in Figure 1b of this application.

The pit will be fenced and netted so that access to the impoundment by wildlife or domestic animals will be prohibited. An 8 foot wildlife fence, including wooden posts and woven wire "sheep's" fence, and standard bird netting, constructed of nylon and 1 inch by 1 inch squares, will be used to restrict access. Recommendations from the Colorado Division of Parks and

Wildlife (CDPW) during the Form 2A consultation will be followed and have been included in Attachment E.

Rule 908.b.(5).D. Fire Lane & Buffer

A fire lane ten (10) feet in width has been designed around the impoundment and a ten (10) foot buffer zone is designed within the perimeter of the fire lane. The plans for the fire lane, buffer area and other construction documents are available in Attachment D.

Rule 908.b.(5).E. Surface Water Diversion Structures

The grading and drainage plans demonstrating compliance with COGCC rules are included in this application. A representation of the Garfield County floodplain designations is included in figure 4. As noted on this map, the area surrounding this facility is an area where no floodplain or floodway has been identified. Based on the elevation difference between the proposed site and area surface water, it is highly unlikely that a flood would impact this facility.

Berry's SWMP and permit is available in Attachment F. The site has been designed for a storm event greater than stated in Rule 908.b.(5).E and is consistent with the Garfield County approved design criteria referenced within the report. In addition, the Final Drainage Report is included in Attachment D.

Rule 908.b.(6). Waste Profile

The information provided in the waste management profile is as follows:

- A mass-flow balance for this facility representing maximum anticipated monthly volumes for receipt and reuse of materials.
- A process flow diagram illustrating the anticipated sources of wastes, delivery for remediation and potential disposal requirements.
- The data set reflecting sampling and analysis of representative waste.

This waste profile information is available in Attachment G. This attachment also provides pipeline maps for the transport of produced water to the P-32 Impoundment. Initial separation of produced water and condensate will occur on well pads prior to piping to the P-32 facility. Water will not be treated on the P-32 site. The only other transport from the site would be by truck for either reuse or off-site disposal.

Rule 908.b.(7).Facility Design and Engineering

The site plan for the facility and the grading plan and drainage report provide details of the facility design and engineering. Also included under a separate tab is a process-flow diagram and process description. The facility has been designed by a professional engineer with features to prevent runoff from impacting the localized surface water features. Berry's operational policies and emergency management procedures for this facility are designed to minimize risk to the environment and accommodate rapid response in the event of any accident.

Rule 908.b.(7).A. Geological Data

A comprehensive report from the Natural Resources Conservation Service (NRCS) is provided in Attachment I and a report of Geologic Hazards is provided in Attachment J. Figure 5 provides the soils map for this project. A generalized geologic map of the area is provided in Figures 6a & 6b.

The location for the proposed water impoundment is primarily underlain by soils of the Parachute-Rhone loams, 5 to 30 percent slopes. Parachute loam, 25 to 65 percent slopes, Irigul channery loam, 9 to 50 percent slopes, and Silas loam, 3 to 12 percent slopes also occur in the vicinity of the proposed impoundment. The Parachute-Rhone loams, 5 to 30 percent slopes, are well drained loam to very channery sandy clay loam that extends to depths of about 52 inches. The other three soils are also well drained loams that range in depths from 17 to 60 inches.

The geology of this area is underlain by the Uinta Formation and Parachute Member of the Green River Formation. The Uinta formation consists of marlstone, sandstone, siltstone, and mudstone. The Parachute Member consists of claystone, marlstone, and shale.

As noted in the geologic hazards report, the primary limitations for shallow excavations are based on the slopes, limited depth to bedrock, and the potential for cutbanks to cave. Consideration has been given to the design and construction of this facility to ensure that slopes are graded appropriately to minimize the potential for cutbank caving. The suitability of the soils in the area is identified as being somewhat to very limited in regard to the construction of ponds or embankments. The limitations identified are primarily applicable to unlined water impoundments. As long as consideration is given to design and construction issues related to the thinness of the soil layer and depth to bedrock, those limitations can be mitigated. Similarly, consideration has been given to the design and operation of a liner system for the impoundment, which will mitigate the potential for seepage and leaks.

Rule 908.b(7). B. Hydrologic Data

A map of surface water features within two miles of the proposed impoundment is provided in Figure 7. As stated in the Wildlife and Vegetative Survey, the proposed location is on a ridge top above all tributary headwaters except Grassy Gulch to the east, which lies approximately 490 feet below the elevation of the pad. As discussed above, the area is not within an area identified as a flood hazard by FEMA. There are no surface waters subject to COGCC Rule 317B located in the vicinity of the proposed project.

According to the Ground Water Atlas of Colorado, the hydraulic conductivity for the Upper Piceance Basin Aquifer ranges from 0.8 to 1.2 feet/day. 90 percent of well yields are less than 22 gpm. The Lower Piceance Basin Aquifer, which is confined by the kerogen-containing Mahogany zone, has naturally high TDS concentrations and is not considered a drinking water source. Based on analysis by Berry in preparation for constructing monitoring wells (for the proposed location), it is unknown if groundwater will be encountered in the first forty (40) feet of strata. If groundwater is in proximity to this location (if present at all) it will be fracture controlled.

The potentiometric surface is approximately 8,000 feet. A description of the hydrologic characteristics of the area is shown in Figure 11.

The location is not within an identified floodplain and is located at an elevation well above the nearest surface waters. An assessment of potential impacts to wetlands and waters of the United States (US) according to the Army Corps of Engineers (ACOE) discussed in the Wildlife and Vegetative Survey determined that no jurisdictional wetlands or drainages would be affected by the project (Attachment E). An area map showing wetland and riparian locations is provided as Figure 8.

A map of surface water features within two (2) miles of the proposed facility is provided in Figure 7. There are no water wells within one (1) mile of the site boundary according to the Colorado Division of Water Resources on-line resources.

There are five (5) springs on Old Mountain where this facility is planned. The approximate locations of these springs are identified on Figure 10. Berry will monitor the following springs:

- Spring PS-1
- Spring RG-1
- Spring HG-1
- Spring 15-1
- Lone Tree Spring

These springs will be tested twice a year, each spring and fall. During exceptionally dry years some or all of these springs may not produce adequate amounts of water to allow for proper sampling and testing. This would typically occur during the fall season after all snow melt water has been released. Berry will make every reasonable effort to sample these springs twice a year but wishes to document that occasionally local geologic and hydrologic conditions may prohibit meaningful data being gathered and reported to the COGCC.

The monitoring and testing schedule of these springs is contained in the Operating Plan available in Attachment K. Copies of all test results will be provided to the COGCC within three (3) months of collecting the samples. Results of the monitoring program will also be included in Berry's annual 900 Series facility report to the Director.

Berry will install up to three (3) monitoring wells, one (1) up-gradient and two (2) down-gradient from the facility. The locations of these wells are provided in Attachment D-Construction Documents, Grading Plan diagram. These wells will be tested twice a year, each spring and fall. The monitoring and testing schedule of these wells is also contained in the Operating Plan available in Attachment K. Copies of all test results will be provided to the COGCC within three (3) months of collecting the samples. Results of the monitoring program will also be included in Berry's annual 900 Series facility report to the Director.

The P32 Water Impoundment Facility has been designed with features that significantly reduce the potential for the impoundment to impact nearby surface and groundwater. The proposed impoundment will have a 60 mil primary HDPE synthetic liner and a 40 mil secondary HDPE

synthetic liner that will cover the bottom and interior sides of the pit with the edges secured around the impoundment perimeter. A grading and drainage plan developed by a Professional Engineer has been included with this application.

A leak detection system will be installed to monitor for any leaks. The facility will be monitored remotely by Berry personnel or operator via a Supervisory Control and Data Acquisition (SCADA) system. Berry will be using an "Innovative Solutions U003 Series Ultrasonic Level Switch" that will be radio linked via a local Remote Terminal Unit (RTU) to an automated surveillance system. The presence of fluid will be traced in real time, logged, graphed and stored at Berry's Parachute office. Alarms will be set to notify operators of the presence of fluids. The device will be installed in the leak detection trap via the eight (8) inch PVC inspection pipe outlined in the constructions drawings.

A water level monitor will be used to ensure a minimum of two (2) feet of freeboard in the impoundment at all times. Berry will be using an American Sensor Technologies "AST 4500" submersible pressure level sensor that will be radio linked via a local RTU to an automation surveillance system. The fluid level will be tracked in real time, logged, graphed and stored at Berry's Parachute office. Alarms will be set to notify operations of unscheduled fluid fluctuations and levels. The device will be installed in a four (4) inch perforated PVC pipe near the leak detection PVC inspection pipe outlined in the construction drawings. Additionally, during normal operations, weekly inspections of the P-32 facility will be performed by a Berry operator or designated representative.

Berry does not anticipate impacts to nearby surface and ground water from the facility. Potential impacts are addressed via adherence to the COGCC approved design criteria for an ongoing assessment of impacts and safe operation of the facility

Rule 908.b.(7).C. Engineering Data

The pond will be constructed with (2) synthetic liners that cover the bottom and interior sides of the pit with the edges secured with at least a thirty-six (36) inch deep anchor trench around the pit perimeter. The primary HDPE synthetic liner will be 60 mil and the secondary HDPE synthetic liner will be 40 mil. The trench is designed to secure, and prevent slippage or destruction of the liner materials. Field seams will be installed and tested in accordance with manufacturer specifications and good engineering practices. Test results are maintained at Berry's office and will be provided to the Director upon request.

The synthetic material is impervious, has high puncture and tear strength, has adequate elongation, and is resistant to deterioration by ultraviolet light, weathering, hydrocarbons, aqueous acids, alkali, fungi or other substances in the produced water used for the facility.

The impoundment will be constructed, installed, and maintained in accordance with the manufacturers' specification. The impoundment was designed with good engineering practices. A leak detection system will be installed to monitor for any leaks. Details regarding specific operational activities associated with the leak detection system are included in the Operating Plan document accompanying this submittal.

Construction drawings demonstrating the design components of the impoundment, depth of cut, dimensions, grades, structures and access road are contained Attachment D - Construction Documents.

Rule 908.b.(8).Operating Plan

The site will be unmanned but remotely monitored via a SCADA system. All personnel on location will have radio and cellular telephone capabilities to reach other Berry employees in the event of an emergency. In order to ensure a safe and timely response to emergency situations, Berry can provide the appropriate authorities with detailed maps, detailed directions, and GPS coordinates to facilitate timely response. Roads will be well maintained and snow-plowed in the winter to facilitate vehicle access. A detailed Operating Plan is provided in Attachment K (see section F of the Operating Plan for emergency response guidance). An Emergency Response Plan approved by the landowner (Encana) and area wide Emergency Response Plan for facilities of this type is provided in Attachment L. Berry's Operating Plan will be implemented and utilized in tandem with the Emergency Response Plan in order to accommodate typical operation of the facility and to address upset conditions including leak detection (see section M of the Operating Plan for additional information).

A copy of Berry's Stormwater Management Plan (SWMP) and Permit has been attached to this submittal as Attachment F. Final details of the specific stormwater best management practices (BMPs) will be included in the SWMP as part of the regular inspection schedule. Diverted water is addressed in the Drainage Plan and via adherence to the SWMP. Updates to the plan, as recorded, will be provided to the COGCC with a Form 4, Sundry Notice.

Rule 908.b.(9).A. Ground Water Monitoring

There are no water wells within one (1) mile of the site boundary according to the Colorado Division of Water Resources on-line resources. A map demonstrating water wells in the general area is provided in Figure 9 of this application.

Rule 908.b.(9).B. Site-specific Monitoring Wells

Berry will install up to three (3) monitoring wells, one (1) up-gradient and two (2) down-gradient from the facility. The locations of these wells are provided in Attachment D – Construction Documents, Grading Plan Diagram. The monitoring and testing schedule of these wells is contained in the Operating Plan available in Attachment K. Copies of all test results will be provided to the COGCC within three (3) months of collecting the samples. Results of the monitoring program will also be included in Berry's annual 900 Series facility report to the Director.

Rule 908.b.(10). Surface Water Monitoring

The sampling program consists of attaining baseline data of the all proximal water sources prior to any construction activity and then periodic sampling as the activity progresses through the construction and operational phases. The targeted sampling schedule for each location is as follows:

- Prior to construction
- After construction/prior to filling impoundment
- Twice annually thereafter

Test points for water sampling relative to this site have been established for the following locations:

- Spring PS-1
- Spring RG-1
- Spring HG-1
- Spring 15-1
- Lone Tree Spring

The approximate locations of these springs are identified on Figure 10.

The Cherry Gulch and Grassy Gulch drainages immediately to the north and east of the proposed location (see Figure 11) are classified as intermittent. They are precluded from sampling because they are typically dry throughout the entire year.

Rule 908.b.(11). Contingency Plan

The P-32 Operating Plan, Standard Operating Procedures and Emergency Response Plan address all elements required by the COGCC contingency planning and are included in this application.

Rule 908.c. Permit Approval

No response required.

Rule 908.d. Financial Assurance

An estimate of the cost for proper reclamation, closure and abandonment of the proposed facility is provided in Attachment A. Upon approval of the proposed facility and prior to commencing construction of the facility, Berry will provide the required financial assurance to the COGCC.

Rule 908.e. Facility Modifications

Throughout the life of the facility, Berry shall submit proposed modifications to the facility design, operating plan, permit data, or permit conditions to the Director for prior approval.

Rule 908.f. Annual Permit Review

To facilitate the annual review of this facility by the COGCC, Berry shall submit an annual report summarizing operations, including the types and volumes of waste actually handled at the facility and the results of all spring and monitoring well samples.

Rule 908.g. Closure

A preliminary plan for reclamation and closure of the facility, as well as the estimated cost to close and reclaim the facility is provided in Attachment B. Upon approval of the proposed facility and prior to commencing construction of the facility, Berry will provide the required financial assurance to the COGCC.

Rule 908.h. Local Permitting

Berry applied to Garfield County to obtain local land use approval via the County's Limited Impact Review (LIR) application process. Copies of Garfield County land use approval documents will be provided to the COGCC upon receipt. This encompasses all requirements for local government zoning and construction.